ARPN Journal of Engineering and Applied Sciences, 2018, vol.13, N8, pages 2979-2982

Control of laser-field technological complexes for tool hardening

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2006-2018 Asian Research Publishing Network (ARPN). Specific features formation of hardened layer of metals with unknown curvature under the joint action of laser radiation and an electrostatic field are described. It is shown, that the quality of the technological process of hardening depends on not only the energy characteristics of the hybrid technological complex, the temperature of the surface layer, but also on the accuracy of positioning the focus of laser radiation and its perpendicularity with respect to the surface of the part. The results of the studies show, that the deviation of the laser radiation focus from the surface of the part should not exceed 8-10 μm, and its vertical not more than 1 degree.

Keywords

Electrostatic field, Laser hardening, Laser-field technology, Quality indicators, Thermal influence zone

References

[1] D.A. Bashmakov. 2010. Model for calculating the parameters of laser thermal hardening, taking into account the influence of the electrostatic field. Socioeconomic and engineering systems: research, design and optimization. 2: 10-14

[2] F.S. Yunusov, R.M. Hisamutdinov. 2004. Calculation of the milling cutter cutting tooth forming profile approximating parameters. Russian Engineering Research. 8: 44-48

[3] F.S. Yunusov, R.M. Hisamutdinov. 2008. Improving the accuracy of the producing surfaces of forming tools. (Kazan: KNITU). 212

[4] I. Kh. Israfilov, D.A. Bashmakov, A.T. Galiakbarov, P.A. Mandrik, M.A. Ganiev. 2014. Analytical description of the temperature field in a material under the influence of a combined heat source. Russian Physics Journal. 57: 148-151

[5] I. Kh. Israfilov, V.A. Pesoshin, V.V. Zvezdin, D.A. Bashmakov. 2010. Control of the electrostatic field by the laser hardening depth in metals. Vestnik KGTU im. A.N. Tupoleva. 2: 47-49

[6] S.M. Portnov, R.R. Saubanov, R.A. Kisaev, I.N. Kuznetsov, I. Kh. Israfilov, V.V. Zvezdin, A.I. Nugumanova. 2011. The system for controlling the heat treatment process by concentrated energy flows of the surface of parts. Global scientific potential-scientific and practical journal. 8: 95-100

[7] V.V. Zvezdin, A.G. Grigoriants, I. Kh. Israfilov. A method for controlling a laser technological complex for welding metals. Vestnik KGTU im. A.N. Tupoleva. 2: 227-230

[8] V.V. Zvezdin, A.V. Khamadeev, R.K. Fardiev, D.I. Israfilov, D.A. Bashmakov. 2007. Influence of the mode composition of laser radiation on the zone of thermal action in metals. Vestnik KGTU im. A.N. Tupoleva. 2: 84-85